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ORIGINAL ARTICLE

Family Building in Transgender Patients: Modern Strategies with Assisted Reproductive Technology Treatment

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Abstract

Purpose: Transgender and gender diverse (TGD) individuals continue to face adversity, stigma, and inequality, especially in health care. This study aimed to characterize the experience of TGD people and partners of TGD people with regard to fertility treatment.

Methods: All TGD patients presenting to a single academic center between 2013 and 2021 were included. Baseline demographics collected included patient age, body mass index, anti-Mullerian hormone, basal antral follicle count, history of gender-affirming surgery, and/or gender-affirming hormone therapy. Outcomes included total patients who progressed to treatment, cycle type(s), and clinical outcomes.

Results: In total, 82 patients who identified as TGD or had a partner who identified as TGD presented to care seeking fertility treatment. Of the 141 planned cycles, 106 (75.2%) progressed to treatment. Of the 15 *in vitro* fertilization (IVF) and co-IVF cycles, 12 achieved live birth. Of the 76 intrauterine inseminations 7 patients were discharged with ongoing pregnancies and one achieved live birth.

Conclusion: These findings reaffirm that TGD individuals utilize the entire array of fertility services. With recent advances in access to care and modern medicine, assisted reproductive technology treatment has the power to support TGD patients in building contemporary family structures.

Keywords: assisted reproductive technology; barriers; equality; insurance; transgender

Introduction

With increasing understanding of gender identity, gender expression, and sexual orientation family groups have broadened to include heterosexual couples, unmarried straight, lesbian, gay, bisexual, transgender, and nonbinary singles and couples with fully, partially, or not genetically linked children. Transgender and gender diverse (TGD) people have gender identities that are not aligned with sex recorded at birth (the latter usually based on appearance of external genitalia). As of 2021, 7.1% of U.S. adults identify as LGBT, and 10% of those individuals identify as transgender.[1] Although TGD individuals have become progressively visible in popular culture and daily life, they still face adversity, stigma, and inequality, especially in health care.[2–5]

Specifically, structural barriers that have been cited by TGD people that preclude them from pursuing fertility care include lack of insurance plan options that offer equally good coverage for expectant parents as well as gender-affirming interventions and high out-of-pocket costs that leave families confronted with the decision to choose between fertility preservation or their child's need to transition.[6–9] Some TGD patients describe their experience in seeking gynecological and reproductive health care as isolating and

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discriminatory, as the strictly binary health care system often leads to denial of health care coverage or unnecessary revelation of their transgender status to their employer.[10]

Data suggest that both trans men and trans women report a desire for children and family building, similar to their cisgender counterparts.[11,12] There are a number of fertility options available to TGD patients. Current fertility preservation options include sperm and oocyte cryopreservation, embryo cryopreservation, and, although experimental, testicular and ovarian tissue cryopreservation.[13–18] Uterine transplantation is also classified as experimental and has only been performed in cisgender females.[14]

In addition, the impact of gender-affirming hormone therapy (GAHT) on fertility is unclear. Although a threshold or duration of hormone treatment has not been established, different studies have revealed contrasting effects of testosterone therapy on ovarian histology. For example, some older studies have suggested that transgender men may have a higher prevalence of polycystic appearing ovaries, whereas more recent data suggest that this may not be the case.[14,15,17,19–21] Similarly, conflicting results exist for the effect of estrogen therapy on testicular function; ranging from testicular atrophy and complete cessation of spermatogenesis, to normal testicular histology and preserved spermatogenesis.[14,16,17,22–25] Consequentially, it is possible that patients with a history of GAHT may have reduced reproductive potential, especially with long-term use.

Several small qualitative studies have looked at the perceptions of TGD patient undergoing fertility preservation; gathering information regarding interactions with health care personnel, gender dysphoria associated with treatment, and whether the overall experience was negative or encouraging.[26,27] However, limited literature is available describing the TGD experience with assisted reproductive technology (ART) treatment, specifically, ART strategies employed by TGD individuals and couples to create families and ART treatment outcomes.[28–30] We sought to describe how TGD identified people and partners contemplate and actively utilize reproductive technology and secondarily, pregnancy outcomes from that treatment.

Materials and Methods

This retrospective cohort study identified all TGD patients and couples presenting to care at a single private academic infertility center between 2013 and 2021. Baseline demographics were collected included patient age, body mass index (BMI), anti-Mullerian hormone (AMH level), basal antral follicle count (BAFC), history of gender-affirming surgery, and/or GAHT. The diagnosis or reason for presentation was also noted, as well as partner status and, if applicable, contribution to the cycle. Primary outcomes included total patients who progressed to treatment, cycle type(s), and clinical outcomes. In addition, if documented, the reason for a patient not progressing to treatment was noted. Means were collected with standard deviation.

Patients were grouped by gender identity (transgender man [female to male, FTM]; transgender woman [male to female, MTF]; partner identifying as transgender man [FTM]; partner identifying as transgender woman [MTF]; and partner identifying as transgender where specific sex or gender identity was not mentioned). These subgroups were also analyzed for progression to treatment, cycle type(s), and clinical outcomes. This study was approved by the Institutional Review Board of the Icahn School of Medicine at Mount Sinai with a waiver of consent for retrospective analysis of de-identified data.

Results

Transgender men (FTM)

In transgender men ($n=32$), the mean age was 27.9 ± 5.8 and the mean BMI was 25.5 ± 6.0. Mean AMH was 3.8 ± 2.6 and the mean BAFC was 19.2 ± 8.0 (Table 1). Planned cycle types included *in vitro* fertilization (IVF) ($n=3$), co-IVF ($n=7$), intra-uterine insemination (IUI) ($n=14$), egg freezing ($n=13$), and embryo freezing ($n=3$). Those that progressed to treatment included IVF ($n=1$), co-IVF ($n=1$), IUI ($n=13$), egg freezing ($n=4$), and embryo freezing ($n=2$).

Nineteen of the transgender men had tissue removed from their chest. Ninety-one percent of the patients who progressed to cycle had a history of testosterone use. All patients stopped GAHT before cycling with a range of time between 2 weeks and 2 years. Two patients presented with the diagnosis of unexplained infertility after trying to conceive with a cisgender male partner. One of those patients proceeded with an IVF cycle and the other chose IUI with intimate partner sperm. Three patients were with a partner they could not spontaneously conceive with (female). Two of these patients used donor IUI and one used Co-IVF with donor sperm. One patient desired single parent family building and did an IUI cycle with donor sperm. Five patients presented with desire for

Table 1. Patient Demographics by Subgroup

Subgroup	Patient FTM ($n=32$)	Patient MTF ($n=10$)	Partner FTM ($n=28$)	Partner MTF ($n=9$)	Partner transgender (gender not specified) ($n=3$)
Average age	27.9 ± 5.84	27.1 ± 9.78	34.9 ± 4.8	37.2 ± 3.0	33.9 ± 2.7
Average BMI	25.5 ± 6.01	Not recorded	25.3 ± 4.5	27.4 ± 6.5	32.6 ± 13.0
Average AMH	3.75 ± 2.60	NA	3.47 ± 2.9	3.48 ± 2.1	Not recorded
Average BAFC	19.2 ± 8.01	NA	18.4 ± 9.2	15 ± 6.6	16 ± 0
Gender-affirming surgery	$n=19$	$n=1$	NA	NA	NA
Prior, current, or planned HT	$n=25$	$n=5$	NA	NA	NA

Patient demographics collected included baseline characteristics of age, BMI, AMH level, and BAFC. Information also collected included whether or not the patient had gender-affirming surgery, and prior, current, or planned HT. Results were organized by subgroup; patient FTM, patient MTF, partner FTM, partner MTF, or partner transgender but gender not specified.

AMH, anti-Mullerian hormone; BAFC, basal antral follicle count; BMI, body mass index; FTM, female to male; HT, hormone therapy; MTF, male to female.

fertility preservation, three of which had plans for gender-affirming hysterectomy and bilateral salpingo-oophorectomy, and one who had plans for GAHT.

The single IVF cycle achieved live birth and the co-IVF cycle froze embryos but did not proceed with transfer due to poor quality. One of the IUI cycles achieved live birth and one patient achieved pregnancy and was discharged to his obstetrician.

Transgender women (MTF)

In MTF ($n=10$), the mean age was 27.1 ± 9.8 (Table 1). BMI was not recorded for this group. None of these patients presented with partners. Eight sperm freezing cycles progressed of the 10 planned cycles. No patients had a history of GAHT; however, 37.5% who progressed to cycle wanted to do so before initiating GAHT.

Partner identifying as transgender man (FTM)

In couples in which the partner identified as a transgender man (FTM) ($n=28$), the mean age was 34.9 ± 4.8 and the mean BMI was 25.3 ± 4.5. Mean AMH was 3.47 ± 2.9 and mean BAFC was 18.4 ± 9.2 (Table 1). Planned cycle included IVF ($n=11$), co-IVF ($n=1$) and IUI ($n=60$). Cycles that progressed included IVF ($n=10$), co-IVF ($n=1$), and IUI ($n=53$). All of these patients presented with a partner that they could not spontaneously conceive with. Eight of the IVF cycles achieved live birth as well as did the co-IVF cycle. Six of the IUI cycles achieved clinical pregnancy and the patients were discharged to their obstetrician.

Partner identifying as transgender woman (MTF)

In couples in which the partner identified as an MTF ($n=9$), the mean age was 37.2 ± 3.0 and the mean BMI was 27.4 ± 6.5. Mean AMH was 3.48 ± 2.1 and mean BAFC was 15 ± 6.6 (Table 1). Planned cycle types included IVF ($n=4$), IUI, ($n=8$), and egg freezing ($n=2$). Cycles that progressed included IVF ($n=1$), IUI ($n=7$), and egg freezing ($n=1$). The couple that pursued IVF did so because the partner had a small amount of frozen sperm banked from before initiating GAHT. One couple who pursued IUI with donor sperm did so because the patient had tubal factor infertility (one tube blocked), and the partner with history of GAHT had oligoasthenospermia. Another couple who pursued IUI with donor sperm did so because the partner did not want to donate sperm as to avoid gender dysphoria. The last couple presented with desire for fertility preservation and successfully froze eggs and sperm for future childbearing before the partner starting GAHT. The single IVF cycle and one of the IUI cycles achieved a live birth.

Partner identifying as transgender (specific sex or gender identity not mentioned)

In couples in which the partner identified as transgender, but the specific sex or gender identity was not mentioned ($n=3$), the mean age was 33.9 ± 2.7 and the mean BMI was 32.6 ± 13.0. AMH was not recorded for this group and mean BAFC was 16 ± 0 (Table 1). Planned cycles included IVF ($n=2$) and IUI ($n=3$). Cycles that progressed included IVF ($n=1$) and IUI ($n=3$). One patient utilized IUI and IVF after trying to conceive with self-insemination with nonintimate partner donor sperm. The other patient utilized IUI with intimate partner sperm, but the reason for doing was not specified. The IVF cycle achieved live birth; however, none of the IUI cycles were successful in achieving pregnancy.

Summary

In total, 82 patients who either identified as TGD or had a partner who identified as TGD presented

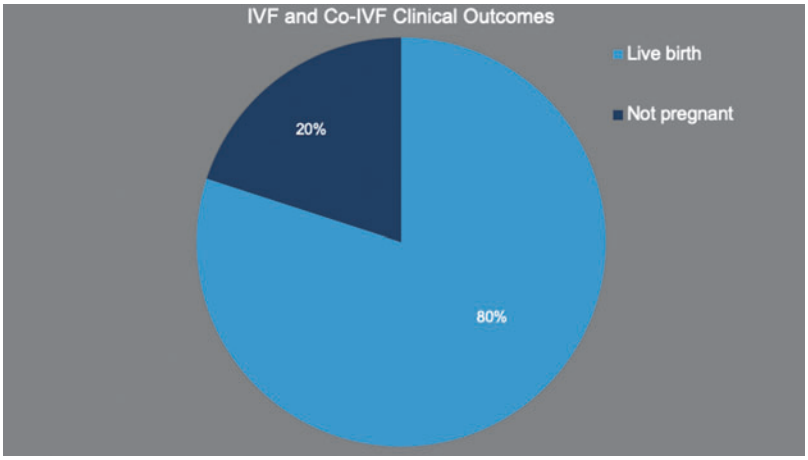

FIG. 1. IVF and Co-IVF clinical outcomes: Of the pooled 15 IVF and co-IVF cycles that progressed to treatment, 12 achieved live birth and 3 did not achieve clinical pregnancy. IVF, *in vitro* fertilization.

for ART treatment. There were 32 transgender men, 10 MTF, 28 transmasculine partners, 9 transfeminine partners, and 3 partners identified as trans but their specific sex or gender identity was not mentioned. Planned cycle types included IVF ($n=20$), co-IVF ($n=8$), IUI ($n=85$), egg freezing ($n=15$), embryo freezing ($n=3$), and sperm freezing ($n=10$). Those that progressed to treatment IVF ($n=13$), co-IVF ($n=2$), IUI ($n=76$), egg freezing ($n=5$), embryo freezing ($n=2$), and sperm freezing ($n=8$) cycles. Of the 15 IVF and co-IVF cycles that progressed, 12 achieved live birth (Fig. 1). Of the 76 IUI cycles that progressed, 1 achieved live birth and 7 achieved ongoing pregnancies, and were discharged to their obstetrician (Fig. 2).

In summary, our study included 141 planned cycles, of which 106 (75.2%) progressed to treatment. Of the completed IVF and co-IVF cycles, 80.0% achieved live birth.[31] 9.2% of the completed IUI cycles achieved clinical pregnancy and were discharged to their

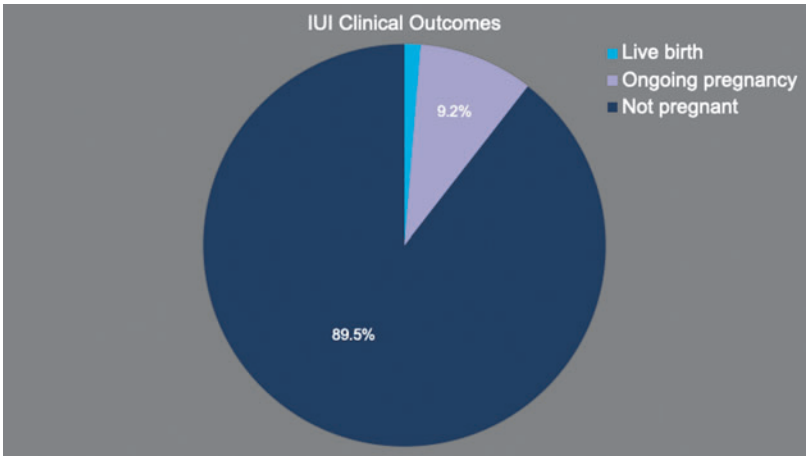

FIG. 2. IUI clinical outcomes: Of the 76 IUI cycles that progressed to treatment, 1 achieved live birth and 7 achieved ongoing pregnancies, and were discharged to their obstetrician. Sixty-eight IUI cycles did not achieve clinical pregnancy. IUI, intrauterine insemination.

obstetrician. Of the 38 patients who did not progress to cycle, 5 patients disclosed their reason, which collectively was lack of insurance coverage and inability to afford the cost of treatment.

Discussion

TGD patients who seek ART treatment can achieve successful pregnancies and grow their families. Transgender identifying patients more often presented for fertility preservation versus partners of transgender patients, whereas partners of transgender patients more often attempted cycles to achieve pregnancy. Not only do TGD individuals have the same desires for parenthood as the rest of the population, TGD patients who undergo ART treatment were able to successfully achieve live births.[32] With recent advances in access to care and modern medicine, ART treatment has the power to support TGD patients to balance their goals of transitioning while engendering their ability to build a contemporary family structure. However, it is important to recognize the various factors that impact the clinical experience of TGD patients who ultimately choose to pursue ART.

American College of Obstetricians and Gynecologists and American Society for Reproductive Medicine oppose discrimination based on gender identity and conclude that TGD status itself should not bar a person from accessing assistive reproductive services.[33] Yet, much opportunity exists for improvement in TGD health care. In addition to biological barriers to family building, members of the lesbian, gay, bisexual, and transgender, queer (LGBTQ) community and in particular the TGD community have faced a lack of education and acceptance that has historically denied them access to ART.[34]

To remediate this, the Healthcare Equality Index (HEI) national LGBTQ benchmarking tool was set forth by the Human Rights Campaign Foundation to evaluate health care facilities' policies and practices related to the equitable and inclusive care for lesbian, gay, bisexual, transgender, and queer patients. Their four core objectives are to ensure foundational nondiscrimination protection for patients, visitors, and staff; demonstrate progress toward inclusion on patient care services and support; cultivate an inclusive workplace for employees, and demonstrate public commitment to the LGBTQ community. Notable criteria of these subcategories include staff training in LGBTQ patient-centered care, medical record systems that offer explicit options to capture patients gender identity when it differs from their sex recorded at birth, LGBTQ-specific marketing, and patient satisfaction surveys.[35]

The National LGBT Health Education Center have also developed a guideline of best practices for frontline health care staff that includes information to gain a better understanding of TGD people and TGD-affirming customer service strategies in health care, including how to address patients, maintaining a respectful workplace culture, and creating a TGD-affirming environment.[36]

In 2016, the Affordable Care Act Section 1557 was clarified to include gender identity in its prohibition of discrimination on the basis of race, sex, age or disability.[37] In addition, 24 states in America and the District of Columbia (D.C.) have "bans on TGD exclusion in health insurance" meaning health insurers cannot explicitly refuse to cover TGD-related health care benefits.[38] Although these motions are in place, trans patients continue to have limited options and difficulty finding insurance plans that offer comprehensive coverage for gender-affirming care as well as ART treatment.[9] Some health insurers have interpreted the legislation in such a way that coverage continues to be declined to TGD individuals based on prohibitive inclusion criteria that are rarely disclosed.[9]

In our study, of the 38 patients who did not progress in their cycles, 5 mentioned a lack in insurance coverage and inability to afford costs of treatment as the reasons they did not proceed. However, access to care secondary to insurance barriers was likely underestimated as each patient was not surveyed toward their reasoning for not progressing with ART treatment. In a survey conducted by Estevez et al., extremely limited information is available regarding infertility coverage to providers and patients who are looking to find the best plan for their patients or own needs, respectively.[39] In turn, socioeconomic factors play a role in which LGBTQ individuals and couples can afford an attempt to build a family.

Conclusion

These findings reaffirm that TGD individuals utilize the entire array of fertility services. With recent advances in access to care and modern medicine, ART treatment has the power to support TGD patients in simultaneously transitioning to their gender identity and building contemporary family structures. Future considerations should include patient surveys on barriers to care and patient satisfaction, to optimize the process and overcome hurdles.

Authors' Contributions

All authors meet full criteria for authorship as defined by the International Committee of Medical Journal Editors. A.G. was responsible for study design and conception, analyzed the data, and wrote the article. D.A. assisted with data analysis and edited the article. J.F. was responsible for conception of the study and assisted with data analysis. W.J.H. was responsible for acquisition of data. J.A.L., M.D., Z.R., J.D.S., and A.B.C. edited the article. All authors approve of this version of the article to be published.

Author Disclosure Statement

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Abbreviations Used

ACA = Affordable Care Act
AMH = anti-Mullerian hormone
ART = assisted reproductive technology
BAFC = basal antral follicle count
BMI = body mass index
FTM = female to male
GAHT = gender-affirming hormone therapy
HEI = Healthcare Equality Index
IVF = in vitro fertilization
MTF = male to female
TGD = transgender and gender diverse